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States are yearly convicted of crime; two per cent. commit capital crime, and one per cent. of this number, or about one hundred persons, are executed every year. Inebriacy is not a voluntary condition within the control of the person. In one thousand cases confined on Blackwell's Island, nine hundred and thirty-five had been returned for the same offence from one to twenty-eight times. The inebriate murderers are subject to delusions, morbid impulses, epileptic explosions, sometimes alcoholic somnambulism; the death penalty has no horrors for them; the first sentence causes others. Inebriate murderers should have a private trial, should be confined for the rest of their life in a military workhouse hospital.

Archives de l'Anthropologie Criminelle. Tome troisième. Paris, 1888. Chronique anglaise et anglo-américaine. Par H. COUTAGNE. pp. 702.

The writer refers in brief to the innovation of electricity in capital punishment. There are two objections to execution of the criminal by electricity: First from the frequent inconstance of electric currents. In England, in 1865 it was tried at the slaughter houses, and in spite of the energy of means employed they succeeded sometimes, but were compelled to resort to more certain methods. The second objection is more serious and will hold even if electricity in the hands of the executioner is made certain; it is, that the punishment by death can produce its preventative effect against crime only by virtue of a brutal method, which does not permit the least doubt as to its reality. Electricity will not produce this preventative effect, and will permit a suspicion of simulation. The writer's second objection is well taken. It may be said, however, that the cruel method, should it prevent a few murders, hardens at the same time the finer sentiments of the great mass of the people; on this basis the taking of life at all has an evil effect; also why should it be taken, if the method of doing it defeats the very end for which it is done? But a thorough statistical investigation rather than arguments may point towards a solution.

De la mort par l'électricité. D'ARSONAL. Archives de l'anthropologie criminelle. 1887.

Arsonal's experiments show that electricity can kill in two ways: (1.) By direct action of the discharge which causes instantaneous and irremediable death by the destruction of the tissues themselves. When a nervous, vascular or muscular tissue is excited by a discharge sufficiently intense to be compared to a thunderbolt, the tissue is completely disorganized, and loses forever its physiological properties. But (2), Death can take place by reflex action in exciting the bulbular centers, as a mechanical irritation would do it. This germ of excitation is accompanied by all the phenomena of action at a distance, studied by Brown-Sequard under the names of inhibition and "*dynamogénie.*" This is why the lesions are not regular, and can present an infinite variety, according to the variable point of the nervous centers excited. Death, artificially caused, is almost always due to an arrest of respiration, which being prolonged causes death definitely by asphyxia. The practical conclusion of the author is, that in the great majority of cases life can be restored on immediately afterwards applying artificial respiration.

IV.—EXPERIMENTAL.

Psychophysiologische Protistenstudien. Experimentelle Untersuchungen von DR. MAX VERWORN. Jena, 1889. pp. 217.

After an affectionate introductory note to his former teachers, Hæckel

and Preyer, the author laments that while it is everywhere recognized that the cell is the morphological unit of life physiology is more and more dwarfed and one-sided because it not only does not penetrate back to the cell, but is not yet even comparative. Of all branches of physiology this is most the case with psychology. Modern physiology rests almost solely upon studies made upon men, dogs, rabbits, guinea-pigs and frogs. Even lower vertebrates are neglected. Only by the study of the strangely fascinating lowest forms of life can we hope to reach fundamental knowledge of psychic phenomena and not by the study of single groups as the insects. Hæckel's consequent monistic ascriptions of an "*atom-soul*" to the final elemental factors of all physical and chemical processes in whatever form conceived, giving these force-centers the most rudimentary sensations and motions, and of a "*plastidule-soul*," endowing the smallest uniform part or molecule of protoplasm, and of a "*cell-soul*," as the total tension-force stored up in protoplasm, is a fundamental assumption of Verworn. Taste and touch mediate the instinctive movements of the lowest organisms. The copious literature of his subject to which one chapter is devoted shows that few zoölogists have assigned elemental psychic functions to protists, while some have ascribed to them very highly developed soul-life.

Movement is of course the only observable expression of psychic life. The many organisms were first collected mostly near Berlin, and their spontaneous movements systematically observed under the microscope and described for each group. Five grades of intensity of light, up to sunlight from a concave mirror, and also spectral colors were then applied as stimulus. Some protists showed no effect; on some light seemed to be inhibitory, in some it caused motion. Strasburger's "photometric" protists seemed tuned to a distinct intensity of light. Some protist varieties are "phototactic" to other colors or wave-lengths. It is doubtless true that selection strives in general toward kinds or intensities of light favorable to chemical processes that advance life and tends to avoid those that are unfavorable, although this tendency was not demonstrated in individual protists.

Temperature stimulation affected not only the power, but seemed in some cases to affect the direction of motion. These phenomena may be called thermotropism, as analogous to heliotropism, and may be best seen in *amœba limax*. Increase of temperature attunes to an higher, decrease to a lower intensity of light. Increase of heat is far more effective than decrease. Both after effects and adaptability are affirmed, but without details. The mechanical stimulus of jarring is still more effective, and thigmotropism (*τὸ θίγμα* = contact) and rheotropism are affirmed of rhizopods and ciliates. The great difference in sensitiveness of different forms to this stimulus is illustrated by numerous wood cuts. Acoustic stimuli had no distinct effect.

The number of chemical substances effective as stimuli is very large. Positive and negative chemotropism and Pfeffer's chemotaktic movements are very marked and are named chemometrie. Not only nutritive but indifferent and even noxious substances are attractive. Some substances are entirely without effect, however concentrated, and the threshold intensity of this form of stimulation varies greatly with different bacteria forms and different substances. Myxomycetæ are distinctly hydrotropic, while curara produces no effect upon ciliary motion; chloroform causes complete narkosis, destroying the power to react to otherwise effective stimuli. Most remarkable is the chemotropism for oxygen for which most protists have a passion. Galvanic currents cause distinct movements, and ciliates turn toward the cathode along the current lines. Geotropism or sensitiveness to gravity is doubtful.

Protists have no demonstrable "organoids" for any of the above forms of stimuli unless ciliae, pseudopodia, etc., aid in the sensations caused by mechanical stimuli.

The last third of the book is devoted to a brief analysis of human psychic activities and an argument that from the automatic movements of protists, something like faint rudimentary unconscious concepts may be assumed, and from their reflex movements unconscious sensations may be inferred, or at least are probable. The parts of divided protists make nearly the same movements in response to all the above kinds of stimulus as the entire animal, only the smaller the part the greater strength of stimulus is needed. Hence the nucleus is not the psychic centre, and "every elementary part of protoplasm has its own independent psyche." Ciliates are physically highest, rhizopods lowest among protists. The movements described, our author believes, are "identical with the molecular processes in protoplasm." There is no distinction between psychic and physiological movement. It is impossible to separate the idea of psyche from the idea of life. While it is proved that this molecular psychology is the most primitive, it remains to demonstrate what is already undoubted, that these processes are the bridge to connect the chemical processes of inorganic nature with the soul-life of the highest animals. As the vital processes in man are related to those of a cell, so are the latter to those of elementary parts of protoplasm, and so again are these last to the processes in any molecule whatever. This is the lofty monism which Demokritus, Bruno, Spinoza and Hæckel have attained, for which all differences between organic and inorganic, between psychic and material processes have vanished, and is to all dual or manifold ideas of the universe as of old monotheism was to all polytheisms.

Der Heliotropismus der Thiere, und seine Uebereinstimmung mit dem Heliotropismus der Pflanzen, von DR. J. LOEB, Assistent am physiolog. Inst. zu Strassburg. Würzburg, 1890. pp. 118. Preis 4 mark.

In his *Vorlesungen über Pflanzen-Physiologie* (2nd ed., Leipsic, 1887.) G. v. Sachs has summed up his remarkable experiments on heliotropism and kindred topics of plant life. Loeb (taking Sachs as his model) attempts to demonstrate all the same laws on lower animal forms, mostly insects. He began with a spinning species of caterpillar (*Porthesia Chrysorrhœa*), of which he put 100 in a reagent glass, and found however often the direction of the glass was reversed they always crept towards the light. If the end towards the light was covered by an opaque sheath they crept light-wards as far as the first edge of the sheath, and there paused. They will leave a lighter part of a tube and pass a long darker passage which opens towards light. They pass out of a ray of direct sunlight into shadow, or vice versa, to get nearer a source of light. For these, as for nearly all insects tested, red and yellow light are much less effective than blue and even violet, and ultra violet has little effect, and all these experiments work only at certain temperatures. Each insect showed the all-constraining tendency to bring the median plane of its body in the direction of the ray at a certain intensity varying with the species, and every insect showed the tendency if proper conditions were observed, so that there was no laborious counting of "parliamentary majorities," as with Lubbock's and Graber's ants. The effect of this stimulus was constant and the insects remained for days as near the light as they could get, and constantly "pointed" at it. Heliotropism is best studied in nearly horizontal directions to eliminate geotropic influences, the latter being however far weaker.

Why moths that only fly by night love the light is made no less a paradox by Romanes' anthropomorphic remark that a candle is a strange object they would examine. By artificial day and night Loeb could change their daily time of flight or rest but a few hours. All night flies so far as studied, are *positively* heliotropic, and never shun light itself. What seems the passion of so many creeping insects for corners,